

CLAIMS

1/ A device for protecting and neutralizing a needle (1, 201) for medical use or the like, the needle having a sharp end (2, 202) and a base end (3, 203), the device being characterized by the fact that it comprises:

5 a sleeve (10, 204) having a through bore (11, 205) defined on a given axis (12, 208), said through bore being of a section that is not less than that of the needle to be protected;

at least one first link (13, 113, 14, 114) having first and second ends (15, 115, 16, 116, 17, 117, 18, 118), said link being of a length " L_1 " defined between said two ends;

first resilient return hinge means (19, 20) for connecting the first end (15, 16) of the first link to the sleeve (10), said first hinge means being organized so that said first link takes up a defined equilibrium position on a direction that makes an acute angle (α) with the axis of the through bore;

15 base means (21, 209) suitable for receiving the base end (3, 203) of the needle to be protected (1, 201);

at least one first crank arm (22, 122, 23, 123), said first crank arm being defined between first and second ends (24, 124, 25, 125 - 26, 126, 27, 127), said crank arm being of a length " l_1 " defined between its two ends, the length " l_1 " of the first crank arm being no greater than the length " L_1 " of the first link; and

first means (28, 128, 29, 129, 30, 130, 31, 131) for mounting each of said first and second ends of the first crank arm to pivot freely respectively on the second end (17, 18) of the first link and on the base means (21, 209).

2/ A device according to claim 1, characterized by the fact that it further includes strut means (40) connecting said link (13, 14) to said crank arm (22, 23) when they are in a first given position, said strut means including a weak point (41) making it possible, on application of a given force, to break said strut means at said weak point.

3/ A device according to claim 1 or 2, characterized by the fact that it further includes snap-fastening means (50) to lock said link and said crank arm relative to each other in a second given position (Figure 5).

4/ A device according to any one of claims 1 to 3, characterized by the fact that it further includes:

a second link (13, 14) having first and second ends (15, 16 - 17, 18), said second link being of a length " L_2 " defined between said two ends;

second resilient return hinge means (19, 20) for connecting the first end (15, 16) of the second link to the sleeve (10), said second hinge means being organized so that said second link takes up a defined equilibrium position on a direction that makes an acute angle (α') with the axis of the through bore;

a second crank arm (22, 23), said second crank arm being defined between first and second ends (24, 25 - 26, 27), said second crank arm being of a length " l_2 " defined between its two ends, the length " l_2 " of the second crank arm being no greater than the length " L_2 " of the second link; and

second means (28-31) for mounting each of said first and second ends of the second crank arm to pivot freely respectively on the second end (13, 14) of the second link and on the base means (21).

5/ A device according to claim 4, characterized by the fact that the lengths " L_1 " and " L_2 " are substantially equal to a common value " L " and that the lengths " l_1 " and " l_2 " are substantially equal to a common value " l ".

6/ A device according to claim 4 or 5, characterized by the fact that the first and second links and the first and second crank arms are situated substantially in a common plane and form substantially a quadrilateral whose diagonals are substantially perpendicular, the diagonal interconnecting the vertices of the quadrilateral situated respectively at the sleeve (10) and at the base means (21) coinciding substantially with the axis (12) of the through bore (11).

7/ A device according to any one of claims 1 to 6, characterized by the fact that at least two of the following elements are made of the same material: sleeve (10); base means (21); link (13, 14); crank arm (22, 23); hinge means (19, 20); and freely pivoting mounting means (28, 29, 30, 31).

8/ A device according to claim 7, characterized by the fact that said at least two elements are made by molding.

9/ A device according to claim 8, characterized by the fact that the material is a plastics material.

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10/ A device according to any one of claims 1 to 9, characterized by the fact that the length " L_1 " of the link and the length " l_1 " of the crank arm are determined in such a manner that the sum $L_1 + l_1$ and the sum $L_1 + l_1 + M$, where " M " represents the length of the sleeve (10), bracket the length " A " of the needle to be protected (1) as measured between its sharp end (2) and its base end (3).

11/ A device according to any one of claims 4 to 10, characterized by the fact that it further includes a casing (70) made of a resilient material surrounding under tension the assembly constituted by the sleeve (10), the first and second links (13, 14), the first and second hinge means (19, 20), the first and second crank arms (22, 23), the first and second means (28-31) for mounting the first and second ends of the first and second crank arms to pivot respectively on the second ends (17, 18) of the first and second links (13, 14) and on the base means (21), and at least a portion of the base means (21).

12/ A device according to claim 11, characterized by the fact that the resilient material from which the casing (70) is made is transparent.

13/ A device according to claim 11 or 12, characterized by the fact that it further includes a sachet (71) made of a non-stretch material, the sachet (71) containing a given substance and being capable of tearing under a given traction, and means (72, 73) for securing the sachet (71) and the casing (70) substantially at two opposite points (74, 75) of the inside wall of the casing (70), the two said points being situated substantially facing the first means (28, 29) for mounting the first ends of the first and second crank arms to pivot freely on the second ends of the first and second links.

14/ A device according to claim 13, characterized by the fact that the substance contained in the sachet (71) presents at least one of the following properties: being suitable for absorbing at least a portion of visible light, being suitable for hardening, being suitable for sterilizing.

15/ A device for protecting and neutralizing a needle (1, 201) for medical use or the like according to any one of claims 1 to 14, the needle having a sharp end (2, 202) and a base end (203), the device comprising:

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a sleeve (204) having a through bore (205), said through bore having first and second outlets (206, 207), said through bore being defined on a given axis (208) and having a cross-section that is not less than that of the needle (201), the needle being suitable for sliding through said bore;

5 a base (209) secured to the base end (203) of the needle (201); and resilient link means (210) connecting the sleeve (204) to the base (209), said resilient link means enabling the sleeve (204) to slide along the needle (201), the needle passing through the bore (205) of the sleeve via the first outlet (206) thereof, said sleeve being suitable for taking up two extreme positions:

10 · a first position in which the sleeve surrounds the sharp end (202) of the needle, said sharp end being situated at a given distance from the second outlet (207) of the through bore (205); and

15 · a second position in which the face (211) of the sleeve (204) that includes the first outlet (206) of the through bore is positioned adjacent to the base (209);

the device being characterized by the fact that it further comprises:

20 a first channel portion (212) made in the sleeve (204) and intersecting the through bore (205) in its portion lying between its second outlet (207) and the sharp end (202) of the needle (201) when the sleeve (204) is in its first position;

25 a shutter (213) slidably mounted in the first channel portion (212), said shutter being suitable for taking up a first position and a second position, the first position being one in which it is not situated in the through bore (205), and the second position being one in which it is situated in the through bore; and

means (220) for applying thrust on said shutter (213) when the sleeve (204) comes close to the base (209) on passing from its first position to its second position.

30 16/ A device according to claim 15, characterized by the fact that the means (220) for applying thrust on said shutter when the sleeve comes close to the base on passing from its first position to its second position are constituted by:

35 a second channel portion (221) made in the sleeve (204) in continuity with the first channel portion (212) and opening out via an outlet orifice (222) in the same face (211) of the sleeve as has the first outlet (206) of the through bore (205);

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a flexible rod (223) preformed into an arcuate bow shape and slidably mounted in said second channel portion (221) in such a manner that a first end (224) thereof is associated with the shutter (213), and a second end (225) thereof emerges from the outlet orifice (222) of the second channel portion by an amount that is not less than the distance the shutter (213) needs to travel in order to pass from its first position to its second position; and

a release cavity (226) adjacent the second channel portion (221) and in communication with said second channel portion, the release cavity being designed so that, when the shutter (213) is held in its first position, the flexible rod (223) can deform in bending to penetrate laterally into said release cavity (226) when the face (211) of the sleeve having the first outlet (206) of the through bore (205) comes close to the base (209).

17/ A device according to claim 16, characterized by the fact that it further includes means (227) for locking the position of the second end (225) of the flexible rod (223) when said rod is caused to enter into the second channel portion (221).

18/ A device according to claim 17, characterized by the fact that the means (227) for locking the position of the second end (225) of the flexible rod (223) when it is retracted into the second channel portion (221) are constituted by at least one barb (228) secured to the flexible rod (223) and a housing (229) complementary to the barb (228) formed in the wall of the second channel portion (221).

19/ A device according to any one of claims 15 to 18, characterized by the fact that the first channel portion (212) has at least a first part (231) and a second part (232) formed on either side of the through bore (205), the first part (231) of the first channel portion being in line with the second channel portion (221), the shutter (213) being contained completely within said first part (231) of the first channel portion (212) when it is in its first position, and by the fact that the device further includes a substantially U-shaped fork (233) secured to the shutter (213), the two limbs (234, 235) of the fork being spaced apart from each other by a distance of not less than the diameter of the needle (201), said fork (233) being shaped in such a manner that, when the shutter (213) is in its first position, the gap (236) defined between the two limbs (234, 235) thereof is situated on the axis (208) of the through bore (205) and the two

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limbs (234, 235) extend at least in part into the second part (232) of the first channel portion (212).

20/ A device according to claim 19, characterized by the fact that the flexible rod (223), the shutter (213), and the fork (233) are made as a single piece.

21/ A device according to claim 20, characterized by the fact that said piece is made of plastics material by molding.

22/ A device according to any one of claims 16 to 21, characterized by the fact that the two channel portions (212, 221) are contained in a plane (240) that also contains the axis (208) of the through bore (205), the sleeve (204) being made as two half-shells (241, 242) organized to be assembled together about said plane (40) containing the two channel portions (212, 221).

23/ A device according to any one of previous claims, characterized by the fact that the base means (21, 209) comprises two first and second rings (301-302, 311-312), the first ring (301, 331) receiving the low end (3, 203) of the needle, and means (320) for connecting said two rings between them by weak points.

24/ A device according to claim 23, characterized by the fact that each of the two rings comprises an opening (321, 322), the two openings being realized to form, when the two rings are connected between them, the female part of a male-female jointing able to cooperate with the complementary male part constituted by an end-part (323) of a syringe (325), the total depth of these two openings when the two rings are connected between them, being lower than the height of end-part of the syringe.

25/ A device according to any one of claims 23 and 24, characterized by the fact that it further includes a not-withdrawal ring (330) located on the wall (331) of said second ring.

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